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| HONEYWELL/HUSCH | | | DINH, BACH T | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/566,867 | Applicant(s) COLLINS, GRAHAM | |
| | Examiner BACH DINH | Art Unit 1724 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1-19 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-19 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-943) | Paper No(s)/Mail Date: ____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Summary

1. This is the response to the communication filed on 06/29/2011.
2. Claims 1-19 remain pending in the application.
3. The application is not in condition for allowance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites “flat sensing and counter electrodes arranged in a mutually parallel arrangement” which is not supported by the originally filed specification. It appears that the Applicant relies on figure 2 for support of the above amendment; however, the originally filed specification does not disclose that figure 2 shows the sensing and counter electrodes are arranged in mutually parallel arrangement. Furthermore, the limitation “each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes” is not supported by the originally filed specification for the same reasons stated above.

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Claims 13 and 17 recite "the current collector and seal combination of claim 1", which includes the limitation "each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes" that is not supported by the originally filed specification as discussed above.

Claims 2-12, 14-16 and 18-19 are rejected as depends of claim 1, 13 and 19, respectively.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1-8, 10-15, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US 5,298,146) in view of Tabata et al. (US 5,667,406) and Chand (US 4,948,496) with further evidence provided by Illman et al. (US 4,522,899).

Addressing claims 1, 13 and 17 Braden discloses a current collector for an electrochemical sensor (figure 2) comprising:

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A housing 13,

Relatively flat sensing 18 and counter 14 electrodes within the housing and in contact with a liquid electrolyte 12;

A plurality of connection apertures in a wall of the housing directly adjacent corresponding edges of the sensing and counter electrodes (figure 2, the connections 16-20 extend from the electrodes to the outside through the wall of the housing 13; therefore, it is the Examiner's position that the wall of the housing has a plurality of connection apertures having bores directly adjacent to the corresponding edges of the electrodes in order for the connections 16-20 to extend to the outside),

The current collector further comprising:

A plurality of relatively straight collectors (16-20), each of the plurality of current collectors extending through a respective connection aperture of the plurality of with an end of each trapped against and in direct contact with one of the sensor's electrodes (figure 2).

In figure 2, Braden at the least suggests that the flat sensing and counter electrodes arranged in mutually parallel arrangement and the each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes. However, lacking explicit disclosure from the specification, Braden is silent regarding the flat sensing and counter electrodes arranged in a mutually parallel arrangement, the current collectors are flexible metal current collectors, each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the

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mutually parallel sensing and counter electrodes and a compliant seal of a thermoplastic elastomeric material is inserted into one of the connection apertures and the configuration of the flexible current collector and the compliant seal as required by claim 1.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify gas sensor of Braden to have the flat sensing and counter electrodes in mutually parallel arrangement and each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes because absent persuasive evidence that the claimed mutually parallel arrangement of the flat sensing and counter electrodes as well as each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes are significant, changes in shape is a matter of obviousness in light of Braden's clear suggestion of the mutually parallel arrangement of the flat sensing and counter electrodes as well as each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes.

Tabata discloses waterproof seal for connector (figures 6-7); wherein, the flexible connector wire 11 extends through a compliant seal A made of an elastomeric material (4:51-54, the seal is made of elastic synthetic rubber, which is elastomeric material) and the seal A being contact with the collector 11 substantially throughout its length along the current collector (figures 6-7) and the arrangement being such that compressive stress induced in the seal A by reaction from the connection aperture urges the seal into

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distributed sealing contact with the current collector 11 substantially throughout the length of the seal (5:5-30, the lip 19 in uncompressed stage has a diameter that is larger than the diameter of the cavity 46 and the inner lip 22 has a diameter that is smaller than the outer diameter of the wire; therefore, when the seal A is inserted into the cavity 46, the compressive stress induced in the seal A by reaction from the cavity 46 would urge the seal into distributed sealing contact with the wire substantially throughout the length of the seal A).

Illman provides evidence to show a sealing material 2 made of synthetic rubber material is in fact a thermoplastic elastomeric material (1:53-2:5).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Braden with the waterproof seal of Tabata for each of the current collectors 16-20 because the waterproof seal would prevent water from entering the gas sensor (Tabata, 2:28-34).

In the modified gas sensor of Braden, the current collectors 17 and 18 would extend within their seals through respective ones of the apertures and the compliant seals A of Tabata are in compression against both the current collectors 17 and 18 and the bores of the apertures in the housing 10 in the similar manner as the complaint seal A is in compression against both the wire 11 and the cavity 46 (Tabata, 5:5-30).

Chand discloses a gas sensor; wherein, the flexible connecting wires 54 and 58 (figure 1) that are connected to the electrodes are made of platinum material (5:46-59).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the current collectors of Braden with the platinum electrode

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connecting material as disclosed by Chand because the platinum is flexible as shown in figure 1 of Chand and provides electrical connection between the electrodes and the measuring device 64 (figure 1 of Chand), that is suitable for the operation of Braden's electrochemical sensor. Furthermore, one would still have obtained the predictable result of providing electrical connection between the electrodes and the measuring device when performing the simple step of substituting the known platinum material for the conductive material of the current collectors 17 and 18 of Braden (Rationale B, KSR, MPEP 2141).

The limitation "over-molded directly onto the flexible, metal current collector" is drawn to the processes of forming the compliant seal over the current collector; therefore, process limitations do not further structurally limit the claimed apparatus (MPEP 2113).

The limitation "the current collects are preliminarily located ... the back-fillings are compressed by end caps" is drawn to the process of forming the seal around the current collector, which does not further structurally limit the claimed apparatus (MPEP 2113).

In figure 7, Tabata discloses the seal A is formed around the wire 11 and the seal A is compressed by the end cap 41, which reads on the structure of the seal and current collector as claimed.

Addressing claims 2-3, figures 6-7 of Tabata, the seal A has many portions with different outer diameters with the outer diameters of the tip portions being the smallest; therefore, the length of the seal A is clearly shown in figures 6-7 as being at least 3 times larger than the outer diameters of the tip portions of the seal.

Addressing claim 4, figure 6 of Tabata shows that the length of the seal A is more than ten times larger than the diameter of the wire 11.

Addressing claim 5, Tabata is silent regarding the length of the seal to the diameter of the wire is at least of the order to 30:1.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the seal of the gas sensor of Braden and Tabata to have a length that is at least 30 times larger than the diameter of the current collector because doing so is a matter of engineering choice and a longer seal would provide additional protection for the current collector along its length. Therefore, one would have arrived at the claimed ratio of the length of the seal to the diameter of the current collector is at least of the order of 30:1 when performing routine experiment in order to optimize the protection provided by the seal to the current collector.

Addressing claims 6-8, Tabata discloses the seal A has a central through bore through which the wire 11 extends; therefore, Tabata discloses the structure of the current collector and seal combination. The subject matters of current claims are drawn to the processes of forming the current collector and the seal combination, which do not further structurally limit the claimed apparatus (MPEP 2113).

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Addressing claim 10, Tabata discloses in figure 4 that the seal A has one or more ridges 19 extending around its outer circumference.

Addressing claim 11, Tabata discloses the seal A has a cylindrical body and a larger diameter outer end boss 20 (figure 4).

Addressing claim 12, Tabata discloses the end tips of the seal A are tapered (figure 4).

Addressing claim 14, Tabata discloses the outer diameter of the ridges 19 is larger than the inner diameter of the cavity 46 (5:11-13); therefore, Tabata discloses an interference fit.

Addressing claim 15, Tabata discloses the seals have cylindrical bodies and the larger diameter outer end bosses 20 (figure 4) and the cavity 46 or connection apertures have a complementary shape (figure 6).

In the modified gas sensor of Braden the apertures made in the housing body 10 would have complementary shape for securely fitting the waterproof seals of Tabata with the current collectors 17 and 18.

Addressing claim 19, Tabata discloses the force exerted by the housing body 45 deform the outer ridges 19 of the seal A without showing any deformation caused to the housing body 45 by the seal A; therefore, it is Examiner's position that the housing body 45 is

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rigid and has the elastic modulus that is at least two orders larger than the elastic modulus of the compliant seal A.

Braden is silent regarding the material of the housing body 13; however, it is quite obvious that the housing 13 of the gas sensor has to have high rigidity in order to provide protection for the internal components. Therefore, at the time of the invention, one with ordinary skill in the art would have modify the body of the gas sensor of Braden to have the elastic modulus of at least two orders larger than the elastic modulus of the seal A because the housing having such property would provide adequate compression force to deform the outer ridges 19 of the seal A; thereby, providing waterproof sealing.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US 5,298,146) in view of Tabata et al. (US 5,667,406) and Chand (US 4,948,496) with further evidence provided by Illman et al. (US 4,522,899) as applied to claims 1-8, 10-15, 17 and 19 above, and further in view of Watanabe et al. (US 5,225,875).

Addressing claim 9, Tabata is silent regarding the seal having two complementary halves having a central groove for receiving the current collector.

Watanabe discloses a watertight seal (figure 5) comprises two complementary halves having a central groove for receiving the wire C.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the seal of Braden and Tabata to have two complementary halves as disclosed by Watanabe because the seal of Watanabe would provide secure watertight connection for the connection wire (Watanabe, 3:2-13). Furthermore, one would have

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obtained the predictable result of forming waterproof terminal connection for the current collector of Braden and Tabata when performing the simple substitution of the watertight seal having two complementary halves of Watanabe for the waterproof seal A of Tabata (MPEP 2141, KSR, Rationale B).

10. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US 5,298,146) in view of Tabata et al. (US 5,667,406) and Chand (US 4,948,496) with further evidence provided by Illman et al. (US 4,522,899) as applied to claims 1-8, 10-15, 17 and 19 above, and further in view of Silfverberg (US 6,638,107).

Addressing claims 16 and 18, Tabata is silent regarding metallic end caps clipped to the housing and captivating the current collectors, thereby providing electrical connections for the sensor.

Silfverberg discloses an electrical connector; wherein, the electrical connector 70 is metallic end cap (4:9, figures 8-9) that clips to the housing 23 and captivating the current collectors 11 (figure 8, the conductors 11 have surrounding sheath to provide electrical insulating and sealant, 4:64-5:13), thereby providing electrical connections (5:15-38).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Braden and Tabata with the metallic cap end 70 of Silfverberg for each of the current collector of Lofgren because the metallic cap 70 would act as electrical connector as well as providing ring seal for the current collector (Silfverberg, 5:5-12).

Response to Arguments

11. With respect to Applicant's comment about the typographical error regarding Examiner recitation of Tabata et al. (US 4,522,406) and the date of 01/27/2011, the Applicant is correct. The error regarding the recitation of Tabata et al. reference has been corrected above. The mistakes are regretted.

12. Applicant's arguments filed 06/29/2011 have been fully considered but they are not persuasive.

13. With regard to Applicant's argument about the 35 USC 112, first paragraph rejections of claims 1-19, the arguments are not persuasive. Firstly, the originally filed specification silent regarding whether the sensor depicted in figure 2 is the actual practical construction of the sensor. It is further evidenced by the fact that figure 2 is an exploded view of the sensor and not the assembled sensor. Secondly, the reference electrode 6, the separator 13 and the porous glass wool separator 15 are disposed between the counter electrode and the sensing electrode; thus, in the assembled gas sensor, the height of the reference electrode 6, the separator 13 and especially the porous glass wool separator 15, which can compress due to the applied pressure, would cause either the counter electrode and the sensing electrode to tilt. Therefore, it is unclear from just the exploded view of the gas sensor and without any explicit teaching from the originally filed specification that the limitation, which requires the sensing and counter electrodes are arranged in a mutually parallel arrangement when the gas sensor is assembled, is supported by the originally filed specification. Likewise, without explicit teaching from the originally filed specification, it is unclear whether the assembled gas sensor would have the limitation "each of the plurality of current collectors extending through a respective connection aperture of the

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plurality of apertures parallel to the mutually parallel sensing and counter electrodes". Hence, Examiner maintains the position that claims 1-19 contain new matters that are not supported by the originally filed specification.

14. With respect to Applicant's arguments regarding the 35 USC 103(a) rejections of claims 1-8, 10-15, 17 and 19, the arguments are not persuasive for the following reasons. Firstly, regarding Applicant's assertion that figure 2 of Braden is a "simplified view" of the sensor, the assertion is incorrect since Braden explicitly discloses "Fig. 2 shows **the practical construction of an electrochemical, multi-electrode sensor**" (4:37-38, emphasis added). Thus, contrary to Applicant's assertion, Examiner maintains the position that the sensor disclosed in figure 2 of Braden is the actual construction of the sensor even if it is shown in a cross sectional view. Secondly, with regard to Applicant's assertion "one would know that the case is shown in outline form because the aperture at the top of the case 1 doesn't show a rear wall which would be the case if FIG. 2 were simply a cut-away view", the assertion is incorrect for the aperture at the top of the container 13 in figure 2 is there in order for gas to permeate into the gas sensor. Thirdly, with regard to Applicant's assertion about the leads being shown as heavy lines, Examiner acknowledges Applicant's assertion; however, Braden does not disclose that the figure 2 is drawn to scale. Therefore, even when the leads are shown disproportionately, one cannot ignore the fact that figure 2 is the practical construction of the sensor and simply concludes that figure 2 is a simplified view of the sensor. Fourthly, with regard to Applicant's assertion about the leads are not being shown as broken lines, the assertion is incorrect because, as stated above, figure 2 is a cross sectional view or cut-away view. One would readily recognize that elements 12-23 are

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contained within the sensor; thus, to follow Applicant's assertion to its logical conclusion, all of the elements 12-23 should be shown as broken lines. Furthermore, Braden has a different method of showing his invention, the broken lines approach may be the Applicant's preferred method of illustration; however, such method is not universal. Additionally, Braden discloses "the counter-electrode 114 and the reference electrode 15 are **brought out** via the connections 16, 17" (4:42-44, emphasis added), which implicitly discloses the presence of apertures in the container 13 in order for the leads 16 and 17 to extend from the interiorly disposed electrodes to the outside. Fifthly, with regard to Applicant's argument that Tabata, Illman and Chand do not teach the placement of apertures or the orientation of current collectors within an electrochemical sensor, the argument is not persuasive for Tabata, Illman and Chand were not relied on for the disclosure of the placement of the apertures or the orientation of current collectors because Braden already discloses such features as discussed above. For the reasons above, Examiner maintains the position that claims 1-8, 10-15, 17 and 19 are obvious over the combined disclosures of Braden in view of Tabata and Chand with further evidence provided by Illman.

15. Applicant's arguments regarding the rejections of claims 9, 16 and 18 are not persuasive because the arguments regarding the rejections of claims 1-8, 10-15, 17 and 19 are not persuasive.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571)272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BD

09/21/2011

/Keith D. Hendricks/

Supervisory Patent Examiner, Art Unit 1724